

included, and the scholarly appearance of the volume suggests that the authors have done their work well, though they do not claim completeness. Previous broadly gauged studies by the senior author (Bishop Museum, Honolulu) are well known for their emphasis on faunistics and systematics. As a complement to this background, the junior author (Dept. of Agriculture, Stock & Fisheries, Territory of Papua & New Guinea) has been associated at least 15 years with economic entomology in New Guinea. The compilation has extended over 7 years, and support has come from the Bishop Museum, National Science Foundation, a Fulbright Fellowship at the University of Queensland, National Institutes of Health, and the Territory of Papua & New Guinea. The printing was done in Japan.

The bibliography includes a large addenda section which contains titles published in 1967; accompanying annotations indicate subject content, including names of new genera and species wherever 5 or fewer are cited. There is a list explaining important geographic synonyms, often caused by the changing political control affecting the area. A list of serial publications explains abbreviations used in the bibliography. Though the bibliography is arranged alphabetically by authors, a 37-page index supplies names of authors of papers dealing with particular subjects and insect groups, including a breakdown to insect families and agricultural subjects (principal crops, etc.). This index may prove to be one of the most used parts of the book.

Not only is this a reference work of outstanding value, but it is interesting to peruse, reflecting as it does the progress made and the trends set in the various historical episodes involving New Guinea entomology, such as the observations and collections of early travelers, the German occupation prior to World War I, the Archbold Expeditions beginning in the early 1930's, activities during and resulting from World War II, explorations and systematic studies by current or recent Dutch entomologists, exemplified by Diakonoff, de Jong, Lieftinck, Toxopeus, van der Vecht, and the Willemes (father and son), and recent Bishop Museum collecting parties and establishment of a field station.

A special bonus is contained for biographers, because for most authors the first citation includes full names, including middle names.

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POGONOMYRMEX HARVESTER ANTS: A STUDY OF THE GENUS IN NORTH AMERICA, by Arthur C. Cole, Jr., 1968. The University of Tennessee, copyright, Knoxville. X + 222 p., 12 pl. (197 fig.), 13 maps, 11 illus. \$7.50.

This genus, comprising two subgenera (*Pogonomyrmex* and (*Ephebomyrmex*) and 60 taxa, is peculiar to the Americas with the exception of one species endemic to Haiti. The author considers only 22 North American species as valid. These ants with the exception of one species, *P. badius*, are confined to the open semiarid and arid areas of our western States, where they commonly nest in sandy or gravelly soil; a few of the less populous and aggressive species nest beneath stones. *P. badius* is limited to the coastal regions of the Gulf and Atlantic States from Louisiana to North Carolina inclusive. In the western States the ants and their characteristic nests are so abundant as to attract the attention of the most casual observer. They are one of the more dominant insects of their region. It is common knowledge the ants feed on plant seeds, much of which they gather directly from the plants themselves. This food is supplemented by the bodies of arthropods, especially insects. Although the workers and females of all species possess stings, some species are very docile and sting only under great provo-

cation. However, most species, especially the more aggressive, have very painful stings. A single sting can be very excruciating, several stings can be agonizing or almost unbearable and could even lead to severe shock or more serious consequences depending upon the susceptibility of the individual to the ants' venom. Two of the species most noted for their painful stings and venom are the western harvester ant, *P. occidentalis*, (Cresson) and the red harvester ant, *P. barbatus* (F. Smith). The seed-eating habits of the ants, their painful stings, and the large areas occupied by their nests make the ants of considerable economic importance.

Paradoxically although *Pogonomyrmex* s. s. are among our most common and easily recognized genera of ants, there has been no end of confusion regarding their specificity. This has even involved such eminent myrmecologists as Mayr, Emery, Wheeler, and many other lesser lights. As the author so aptly states these errors have been due to lack of adequate material as well as thorough field studies, and especially to the high degree of variability in the sculpturing of their bodies as well as the amount of development of the epinotal spines. Earlier students had believed the epinotal spines were rather constant in the degree of development, and therefore the ants could be divided taxonomically into two groups on the basis of the presence or absence of epinotal spines. *P. comanche* offers an excellent example of the utter confusion resulting from such beliefs.

Until the present work there was no comprehensive treatment of our North American *Pogonomyrmex*. Olsen in 1934 had published an abbreviated study of our forms and Creighton in 1951 in his book on North American Ants had improved the status of them to some extent based on a limited amount of material. In spite of these works, though, many errors in determination were being made constantly. Fortunately Dr. Cole, who had approximately 35 years of experience in the study of North American ants, became greatly interested in *Pogonomyrmex* and decided to revise the genus. He entered upon his studies with no preconceived ideas of their classification and entirely uninfluenced by the work of previous taxonomists. He spent approximately 10 years studying literally hundreds of thousands of individuals in both field and laboratory. In the laboratory individuals of every caste (where available or known) were studied as both whole and dissected specimens. All good characters for the separation of the ants into subgenera, complexes, and species were carefully assembled and used. Drawings were made of characteristic anatomical structures and maps prepared to show the distributional range of each species. To aid him also in the studies the author secured types of every available species as well as borrowed material from museums and private individuals. He also visited all important museums in this country and has spent two summers in Mexico studying the ants in the field.

The book resulting from these 10 years of careful painstaking work in both field and laboratory treats 19 species of *Pogonomyrmex* s. str. and 3 species under *P. (Ephebomyrmex)*. New synonyms of the former are: *migrescens* under *barbatus*, *ferrugineus* under *desertorum*, *spadix* under *rugosus*, *dentalis* under *lenuispina*, *estebanini* and also *nitratus* under *californicus*, and *barnesi* under *maricopa*. One species, *anergismus*, is unique in being workerless. It has been found on one occasion only in the nest of *rugosus*.

The book in addition to the contents discussed in the title contains a preface, table of contents, introduction, general considerations, discussion of character convergence, generic status and subgenera, systematic treatment of the species, species indeterminata, anomalies, glossary, bibliography, and index.

The systematic treatment fully characterizes and keys every caste (where known or available) of each species

in the subgenera, complexes, and species. Under the text treatment of each species are given, the species' valid name, synonymies, change of status, literature references, type-locality, deposition of types and distributional range.

To my knowledge no other North American genus has been studied so long and so carefully. The format of the book is excellent. I cannot think of any subject the author has failed to cover, even to types of nests and preferred habitats. At least two criticisms might be justifiable—the unusual length of most of the keys and the lack of clear, well defined State boundaries of the regional maps. The high degree of variability of the species explains the necessity for long, detailed keys. The lack of clearly defined state boundaries in the maps is offset by the author's listing the range of each species by State names. The author is deserving of the highest praise for this excellent book, which should serve as a model for future publications in myrmecology. Copies should be in the hands of all myrmecologists as well as in all libraries that deal with biology and natural history.

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RESIDUE REVIEW, Volume 18. RESIDUES OF PESTICIDES AND OTHER FOREIGN CHEMICALS IN FOOD AND FEEDS, edited by Francis A. Gunther. 1967. Springer-Verlag New York Inc. 227 pp. including index. \$9.80.

This volume consists of six papers, three dealing with various aspects of pesticide residue analysis and three related to the metabolism and physiological effects of pesticides.

The paper by H. Beckman and W. O. Gauer (Solvent Purification for Residue Analysis by Non-distillation Methods) is concerned chiefly with the use of adsorbent columns to obtain solvents of the high purity required in pesticide-residue work. After a description of several common adsorbents and a discussion of precautions to be taken in the processing and storage of solvents, methods which have been employed for various solvents are reviewed.

In Chromogenic Spray Reagents for the Organophosphate Pesticides R. R. Watts reviews chemical and enzymatic methods used for detection for these pesticides on paper and thin-layer chromatograms.

W. E. Westlake and F. A. Gunther (Advances in Gas Chromatographic Detectors Illustrated from Applications to Pesticide Residue Evaluations) give a comprehensive discussion of detectors which have been used for pesticide residue analysis; they also comment briefly on collection devices and general gas chromatographic technique.

Mammalian toxicology of pesticides and interactions of pesticides with other factors which might modify their toxic effects are discussed in the extensive review by W. F. Durham (The Interaction of Pesticides with Other Factors). Many of these interactions are considered to be mediated at least partially through the liver microsomal enzyme systems, which are discussed in considerable detail. Factors which are considered include physiologic states (species, sex, age, nutritional status, heredity, disease), environmental conditions (temperature, light), routes of exposure, formulations, and other chemical agents. Organophosphorus pesticides, organochlorine compounds, carbamate pesticides, herbicides, fungicides, and synergists are included in the discussion.

In the paper on mammalian metabolism of pesticides (Der Stoffwechsel von Pesticiden in Säugetieren by W. Ernst) concise summaries of observed metabolites and mode of excretion are presented for 50 insecticides and herbicides. (A section of the material on dimethoate is misplaced and appears on the following page under Summation.)

Blood cholinesterase inhibition and the application of cholinesterase assays in monitoring for occupational exposure to organophosphorus and carbamate insecticides are

discussed by J. C. Gage (The Significance of Blood Cholinesterase Activity Measurements). After considering methods of assay and the observed variations in blood cholinesterase activity for normal populations and for given individuals, Gage proposes that an inhibition of 30% below a pre-exposure activity value for the same individual be regarded as a biological threshold limit—a degree of inhibition which, if exceeded, is evidence of sufficient exposure to indicate unsatisfactory working conditions or to be evidence of exposure, but which is not great enough to be evidence that the subject is at risk or to be associated with toxic manifestations.

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RESIDUE REVIEWS, Volume 22. RESIDUES OF PESTICIDES AND OTHER FOREIGN CHEMICALS IN FOODS AND FEEDS, edited by Francis A. Gunther. 1968. Springer-Verlag New York, Inc. 120 pp. including index. \$9.50.

The first of the two reviews contained in volume 22 (Properties, Effect, Residues and Analytics of the Insecticide Endosulfan, by H. Maier-Bode) is a compilation of information on endosulfan covering a variety of fields; it should be a valuable reference source. Topics discussed include physical and chemical properties; toxicity; action on insects; degradation and metabolism; the nature, concentration, and persistence of residues; tolerances in effect in 1967 in various countries; and methods of analysis for identification, detection, and quantitative determination in formulations and in residues. Residue analysis is discussed in considerable detail. Formulas are given for the two endosulfan isomers, but which is the lower melting α -endosulfan and which the higher melting β -isomer is not identified.

In the second paper (Einfluss von Nacherntefaktoren auf die Rückstände von Pflanzenschutzmitteln in Obst, Gemüse und einigen Sonderkulturen) H. Stobwasser, B. Rademacher, and E. Lange discuss changes in pesticide residue concentrations as they are affected by post-harvest treatments such as storage at various temperatures, freezing, washing, and processing. Much of the material presented deals with insecticides, but herbicides and fungicides are also included. A table summarizes the tolerances in effect in 1966 in the U.S.A., Netherlands, and West Germany for 50 pesticides. In many ways this paper and the one making up Volume 21 of Residue Reviews (Residues in Raw and Processed Foods Resulting from Postharvest Insecticidal Treatments by D. L. Lindgren, W. B. Sinclair, and L. E. Vincent) supplement each other. Both are concerned with post-harvest residues, but Stobwasser et al. deal with residues in fruits, vegetables and specialty crops (olives, peppermint, hops, mustard greens) resulting from pre- or post-harvest applications of pesticides, while Lindgren et al. are concerned exclusively with residues from post-harvest applications of insecticides and they include grains and nuts in their discussion. Surprisingly, there is essentially no duplication in the references cited in the two papers despite the correspondence in subject matter.

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DE NEDERLANDSE BLADROLLERS (TORTRICIDAE) (THE LEAFROLLERS (TORTRICIDAE) OF THE NETHERLANDS), by G. A. Count Bontinck and A. Diakonoff. 1968. Monografieën van de Nederlandse Entomologische Vereniging, no. 3, p. 1-201, pl. 1-99. \$20.00.

The authors present a current treatment of the 276 species of Tortricidae of the Netherlands. They point out that the latest review of their fauna was in 1882, and subsequent to that time such important structural char-